

Description of MODIS-N Aircraft Sensor (MAS) and Calibration for the MODIS Science Team. 3-7-91

The MODIS-N Aircraft Sensor (MAS) will collect spectral data in a spatial format from the ER-2 aircraft. The MAS data set will test atmospheric science research algorithms and information extraction to simulate the MODIS-N data set analysis for EOS-A.

The MAS is to be purchased as a modification of an existing aircraft sensor being built for Ames Research Center. This sensor, the Wildfire, was designed to spot forest fires. The original instrument is a fifty channel, four detector port receiver coupled to a rotating scanning mirror head. Each receiver port disperses light onto cooled linear array detectors. The bandpass of selected channels is determined from the geometric location of the linear array detector element with respect to the position of the dispersed spectra. By altering positions of two of the four receiver ports, several MODIS channels can be obtained. Two other receiver ports will be built for detecting visible band data and earth emitting infrared band data with detector arrays and gratings developed for these bandpasses. The converted Wildfire will simulate 12 to 14 MODIS-N channels. Negotiations to increase the number of MODIS-N channels are in process, however, the telescope aperture, the gratings, channel bandwidth, and the detector response limit the changes that can be made.

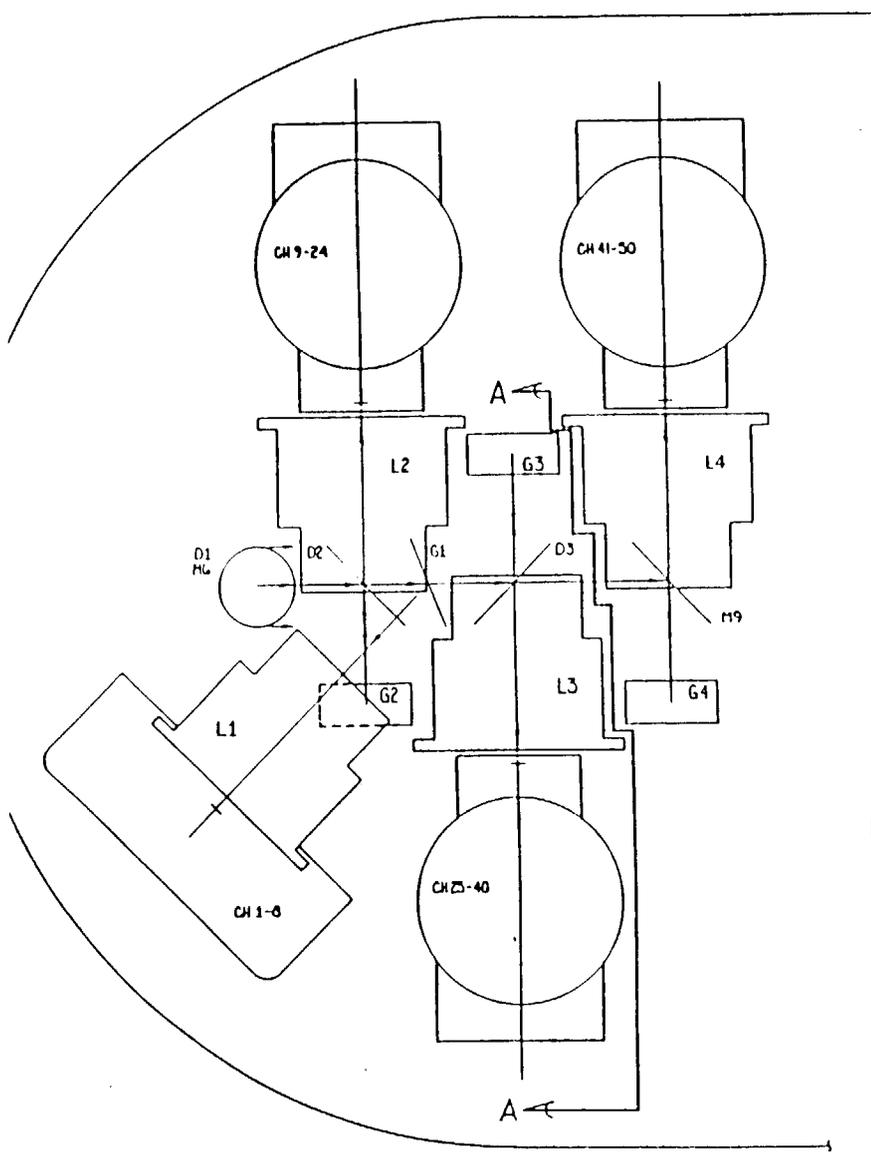
The aircraft data system digitizes and records up to 12 channels per flight. Ames plans to replace the data system with a larger capacity unit.

The MAS requires visible and infrared calibrations. It is estimated that the calibration tests of the MAS will be similar in nature to those performed on other aircraft sensors developed by Ames and Goddard. Normally the calibrations require targets and background light conditions which are highly controlled. The Ames targets and procedures will be examined during the course of the MAS development to determine the appropriate integration and test methods.

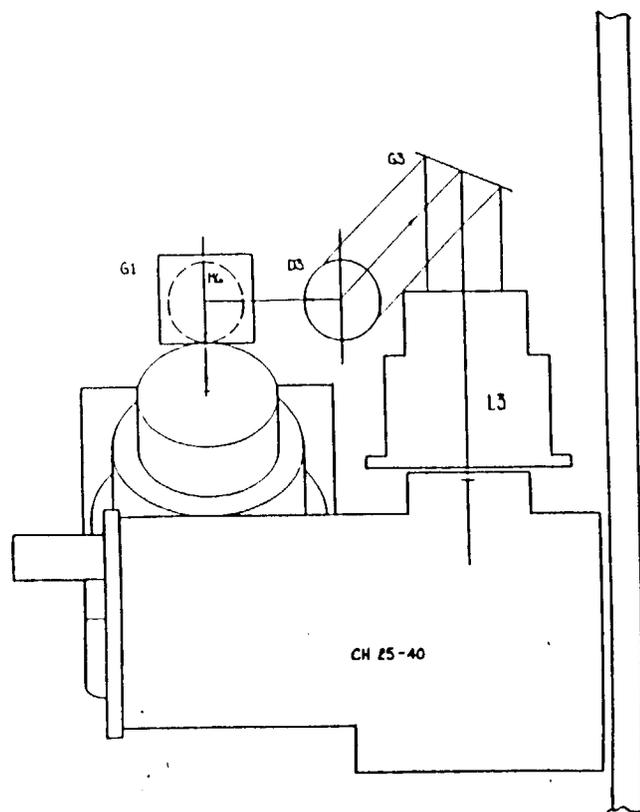
Note: GSFC has contracted to modify the detectors of an Ames sensor. GSFC has only indirect responsibility for its calibration.

MODIS-N Airborne Simulator (MAS)
channels and performance goals
7-10-91

No	band (um)	edges (um)	width (um)	radiance w/m2 um sr		snr	scene temp (K)		netd (K)
				max	typ		max	typ	
1	.555	.535-.575	.04	518	21	130			
2	.659	.634-.684	.05	685	21.8	260			
3	.705	.685-.725	.04						
4	.745	.725-.765	.04						
5	.785	.765-.805	.04						
6	.825	.805-.845	.04						
7	.865	.845-.895	.04	285	24.7	270			
8	.905	.890-.920	.03	185	10.0	80			
9	.940	.915-.965	.05	189	15.0	180			
10	1.64	1.605-1.655	.05	70	7.3	200			
11	1.68	1.655-1.705	.05						
12	1.73	1.705-1.755	.05						
13	1.78	1.755-1.805	.05						
14	1.83	1.805-1.855	.05						
15	1.88	1.855-1.905	.05						
16	1.93	1.905-1.955	.05						
17	1.98	1.955-2.005	.05						
18	2.03	2.005-2.055	.05						
19	2.08	2.055-2.105	.05						
20	2.13	2.105-2.155	.05	22	1.0	187			
21	2.18	2.155-2.205	.05						
22	2.23	2.205-2.255	.05						
23	2.28	2.255-2.305	.05						
24	2.33	2.305-2.355	.05						
25	2.38	2.355-2.405	.05						
26	3.00	2.925-3.075	.15						
27	3.15	3.075-3.225	.15						
28	3.30	3.225-3.375	.15						
29	3.45	3.375-3.525	.15						
30	3.60	3.525-3.675	.15						
31	3.75	3.675-3.825	.15		.45	115	335	300	
32	3.90	3.825-3.975	.15						
33	4.05	3.975-4.125	.15						
34	4.20	4.125-4.275	.15						
35	4.35	4.275-4.325	.15						
36	4.50	4.325-4.575	.15						
37	4.65	4.575-4.725	.15						
38	4.80	4.725-4.875	.15						
39	4.95	4.875-5.025	.15						
40	5.10	5.025-5.175	.15						
41	5.25	5.175-5.325	.15						
42	8.55	8.30-8.80	.5				300	240	.49
43	9.65	9.40-9.90	.5				280	230	.54
44	10.80	10.15-10.55	.5				320	240	.56
45	11.03	10.78-11.28	.5				320	240	.46
46	12.02	11.77-12.27	.5				320	230	.56
47	12.7	12.45-12.95	.5				320	230	.59
48	13.3	13.05-13.55	.5				280	230	.62
49	13.8	13.55-14.05	.5				250	230	.65
50	14.3	14.05-14.55	.5				230	220	.77



TOP VIEW



VIEW A-A

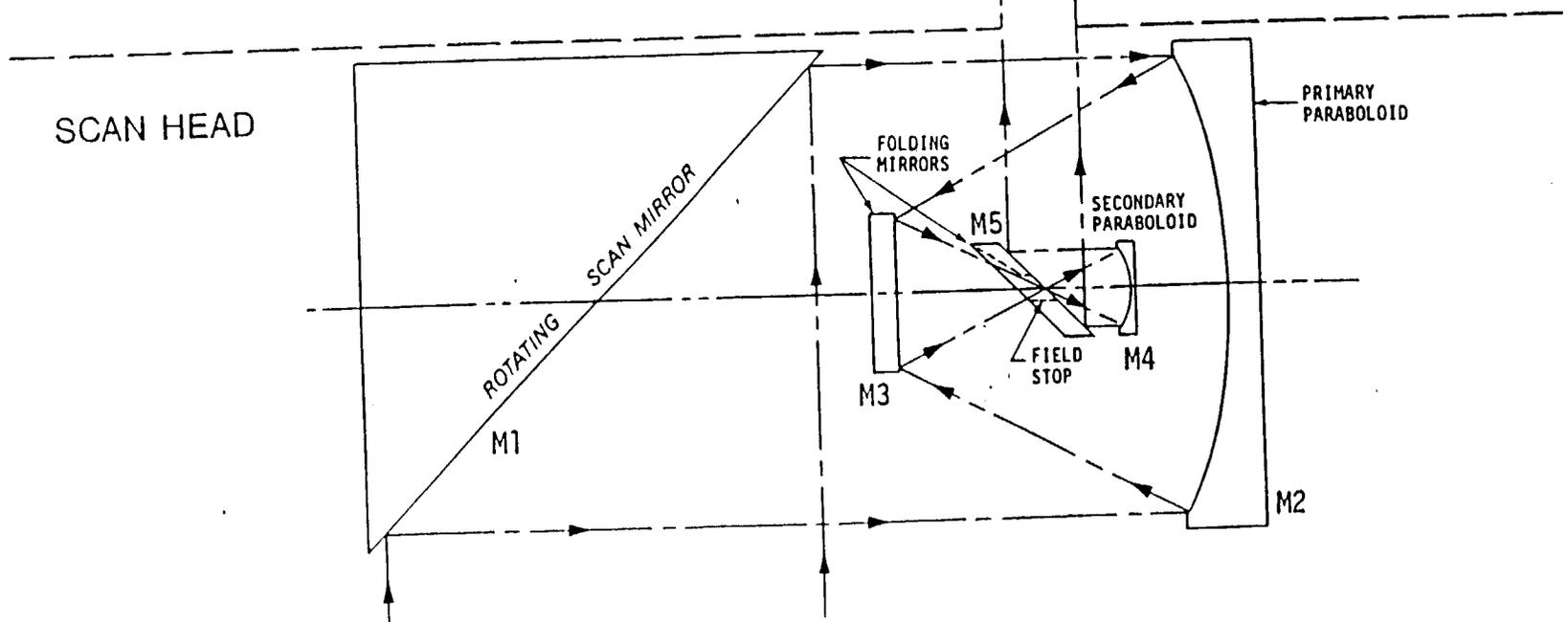
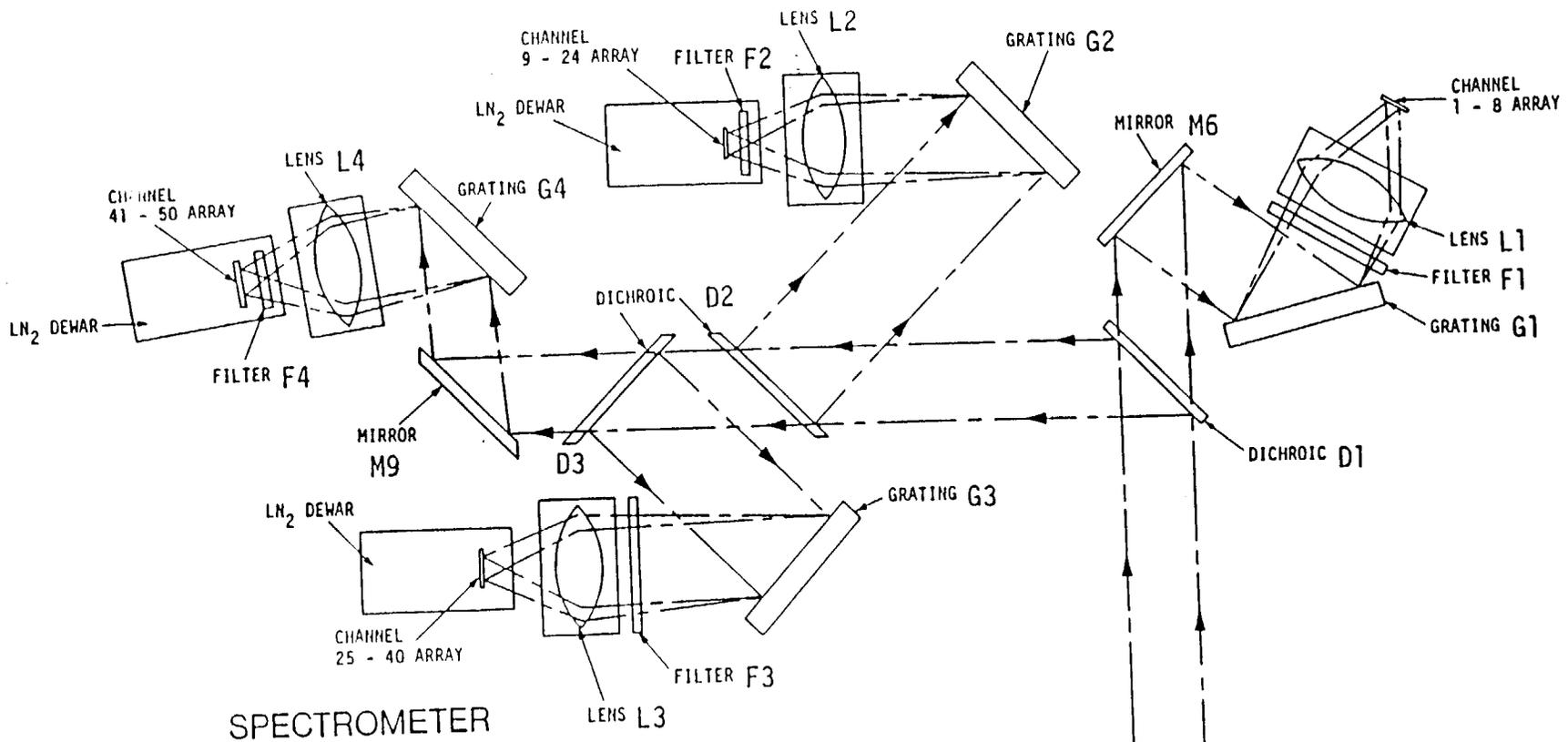


FIGURE 1 MAS OPTICAL SCHEMATIC

MAS DATA FORMAT

HEADER--12 BYTES

DATE,SCAN LINE,RUN

BLACKBODY #1 AND #2 --4 BYTES

TEMPERATURE SENSOR

SCAN FORMAT --7 BYTES

SPEED,ROLL,TIME CODE,CHANNEL

VIDEO OUTPUT --716 BYTES

BLACKBODY VIDEO #1 AND #2--2 BYTES

SAMPLE AND HOLD VALUES

MAS SYSTEM CALIBRATION DESIGN

VISIBLE CHANNELS

DETECTOR ENVIRONMENT
HOUSEKEEPING TEMPERATURE

THERMAL CHANNELS

DEWAR TEMPERATURE
BLACKBODY CALIBRATION

SYSTEM

HOUSING TEMPERATURE
FLIGHT ASCENT/DESCENT
ELECTRONICS HOUSEKEEPING

MAS CALIBRATION

VISIBLE CHANNELS:

GROUND CALIBRATOR

THERMAL CHANNELS:

IN-FLIGHT TWO POINT REFERENCE SYSTEM
GROUND CALIBRATION